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Session B3 - Road crossings limit nothern pike access to seasonal spawning habitat

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Prioritizing Barrier Removal for Northern Pike Spawning Migration in Green Bay Tributaries

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1 WISCONSIN DEPT. OF NATURAL RESOURCES

2 THE UNIVERSITY of WISCONSIN MADISON

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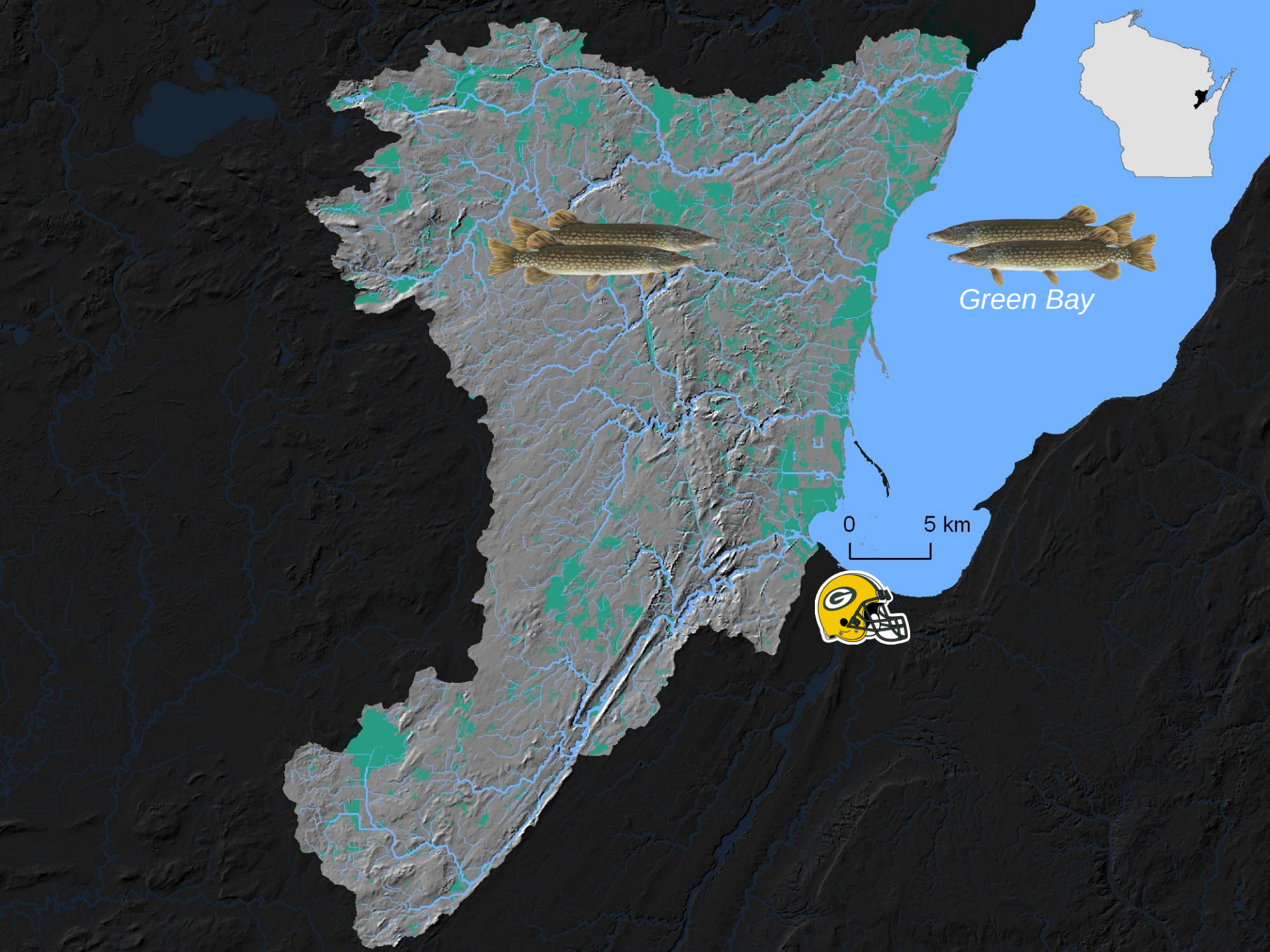
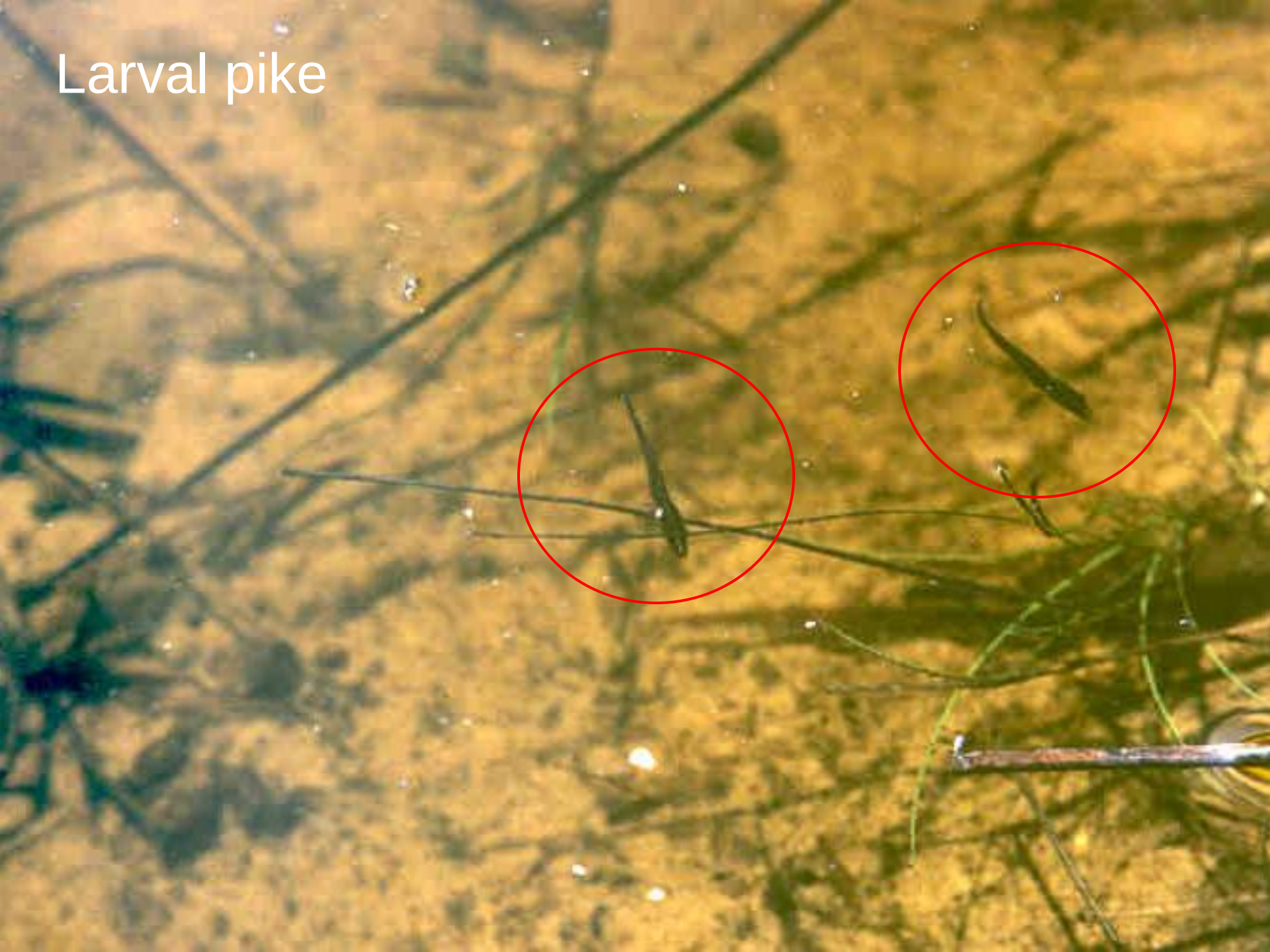
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

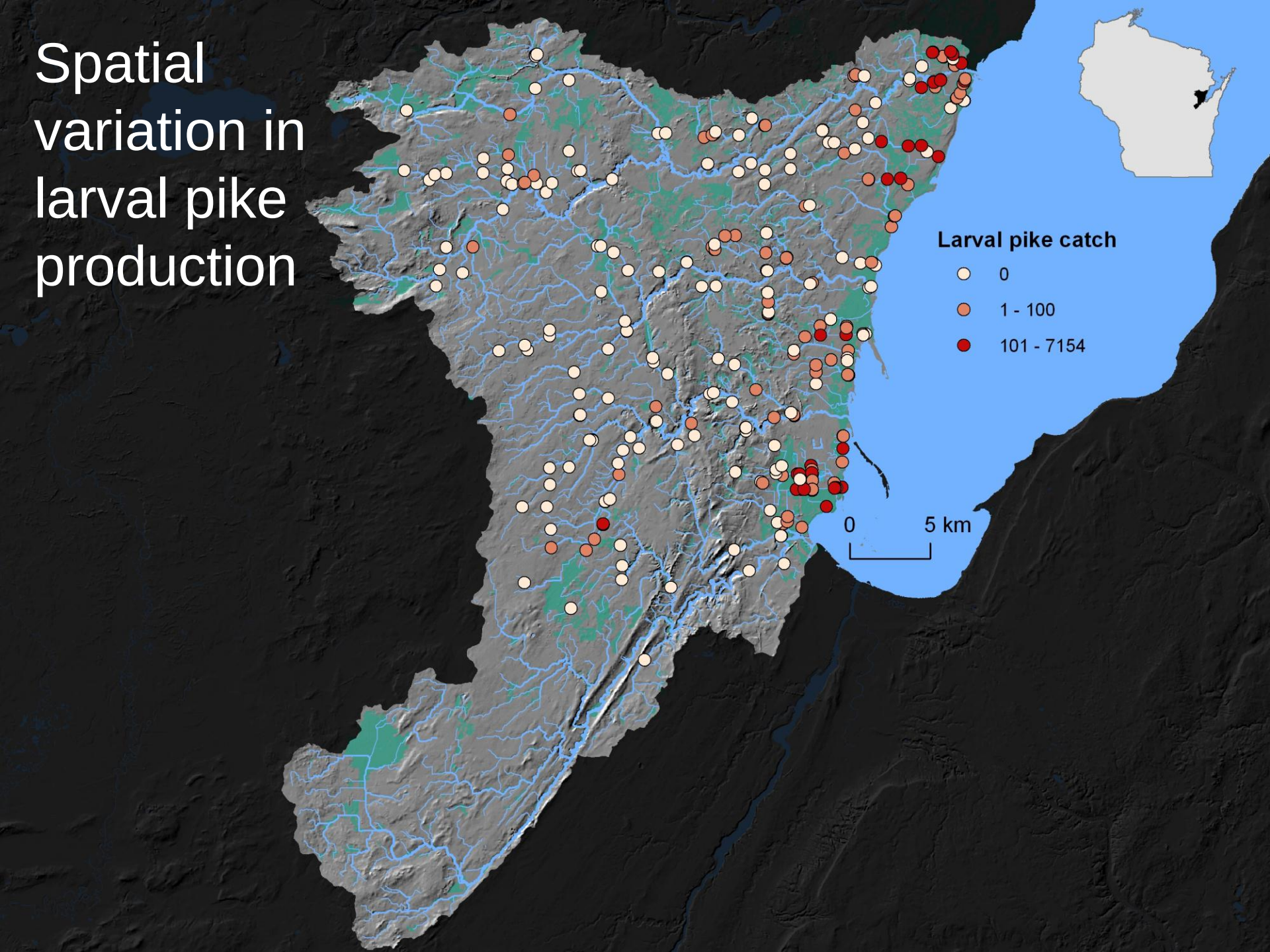

Green Bay
0
5 km

Northern pike spawning habitat

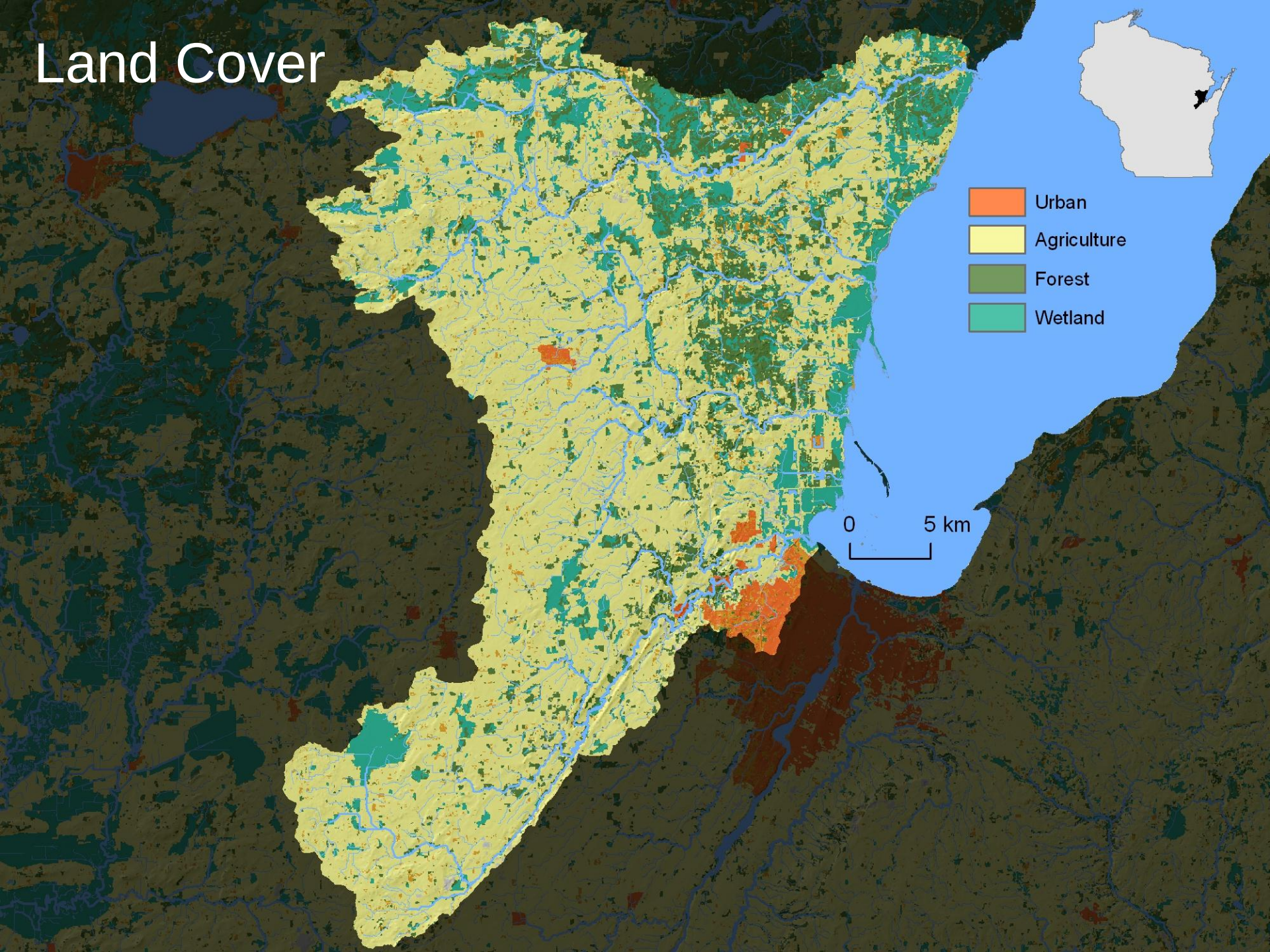

Adult pike


Larval pike

Spatial variation in larval pike production



Land Cover



Causes of Recruitment Declines

Wetland drainage
Land cover change

Migration barriers

Research question

- What explains spatial variability in larval pike production?
  - Spawning habitat quality
  - Distance
  - Barriers

Management objective

- Prioritize barrier removal to improve access to northern pike spawning habitat

Context

- Address habitat impairment in Area of Concern (AOC)
- Focus of EPA Great Lakes Restoration Initiative grants

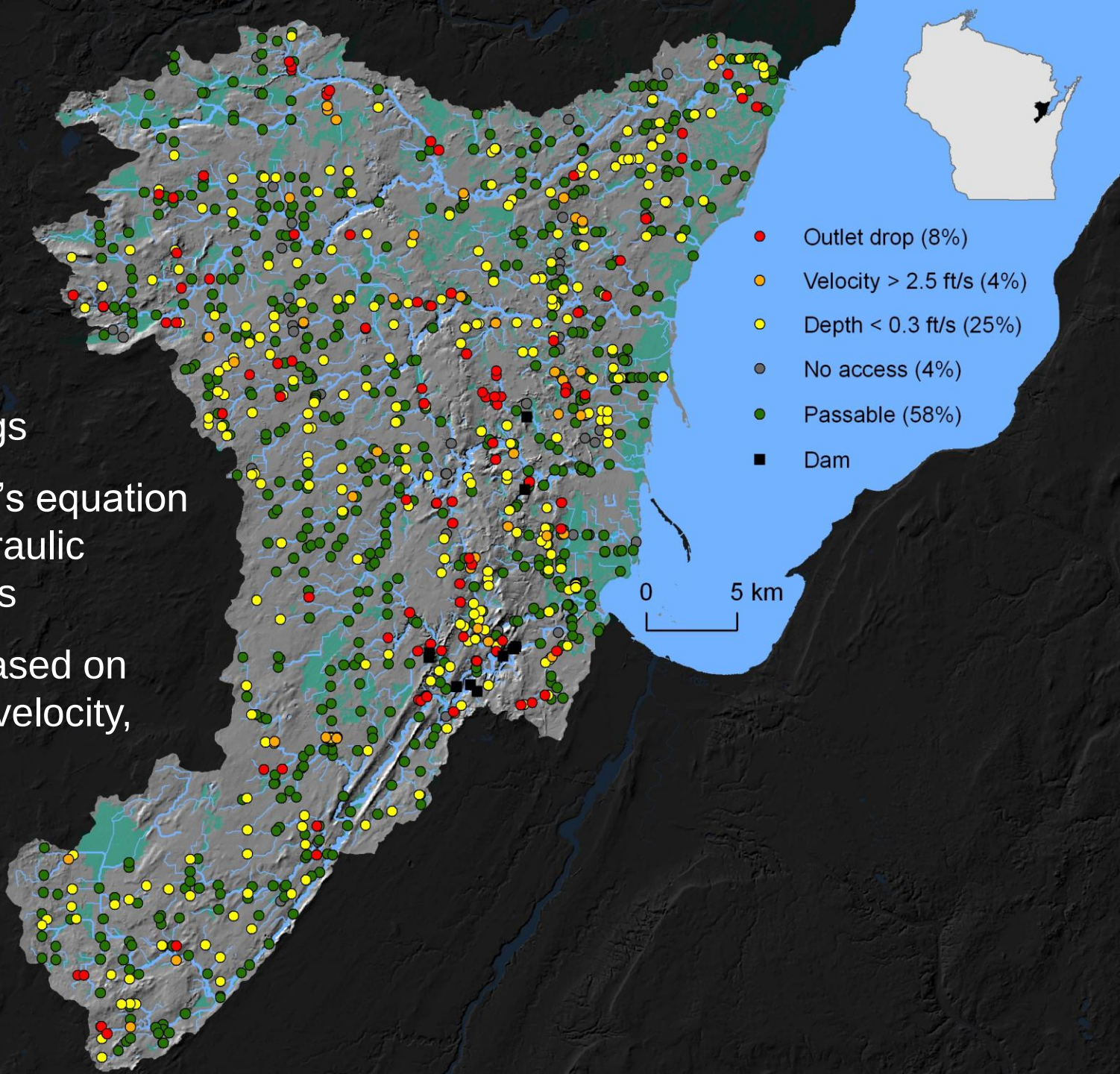
Survey adult and larval pike distribution

Road Crossing Inventory Protocol

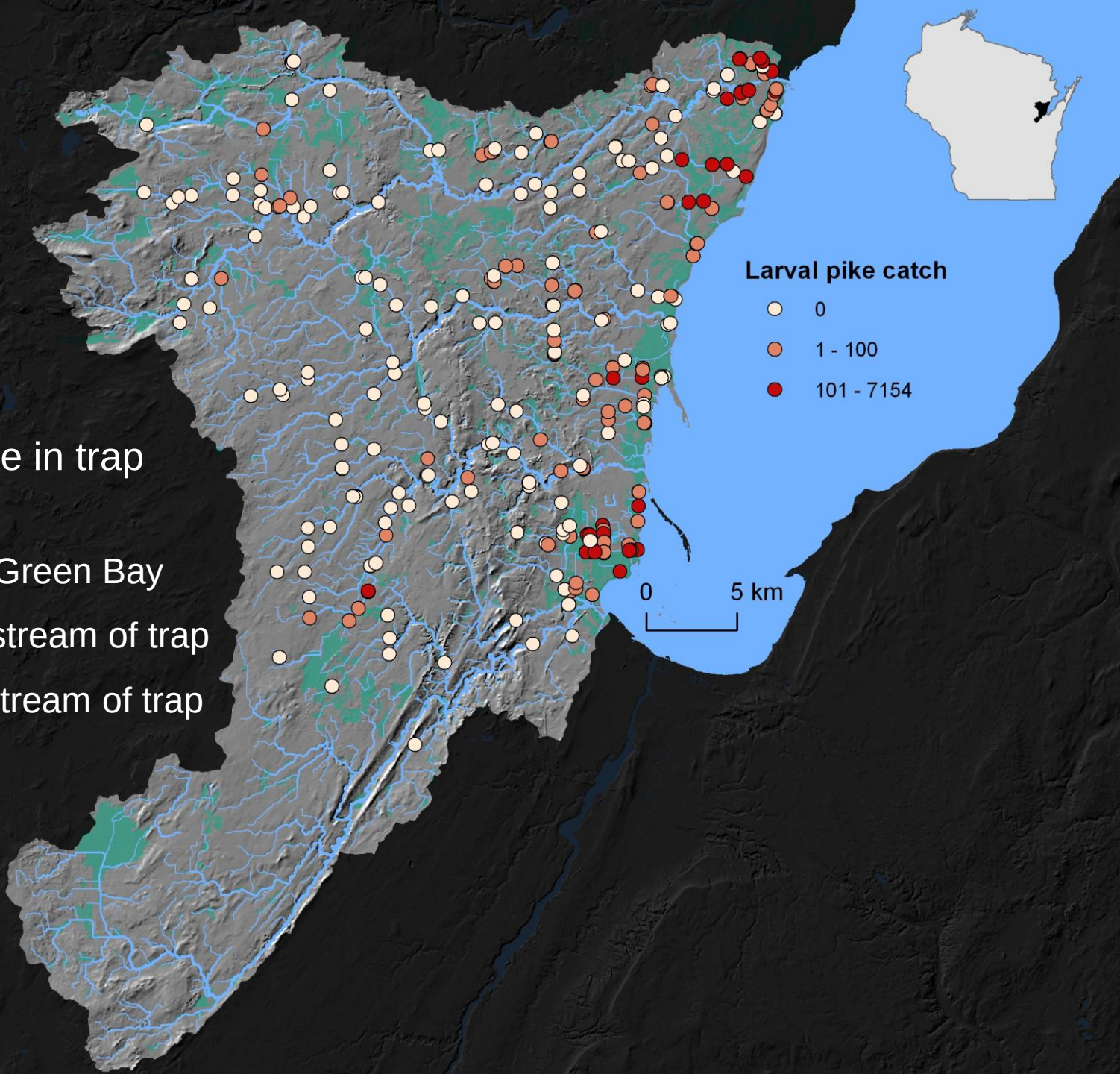
- Goal: Estimate passability by fish and cost to replace with fully passable crossing.
- 10-20 minutes per crossing
- Equipment:
  - Tape measure
  - Survey rod and level or current meter
  - Trimble Yuma field computer with ArcPad software

Survey road crossings

- 1108 crossings
- Use Manning's equation to model hydraulic characteristics
- Passability based on water depth, velocity, outlet drop



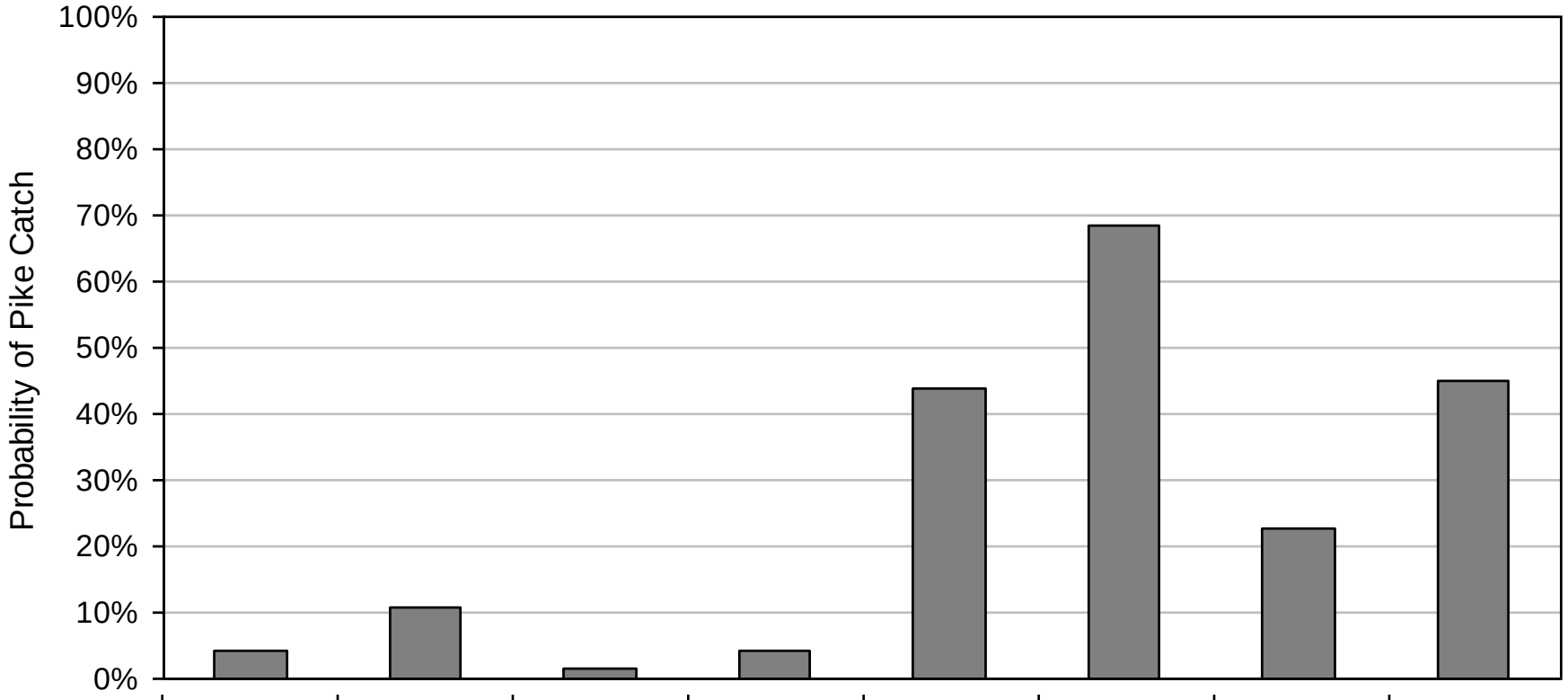
Model larval pike production



Presence of pike in trap based on:

- Distance from Green Bay
- Land cover upstream of trap
- Barriers downstream of trap

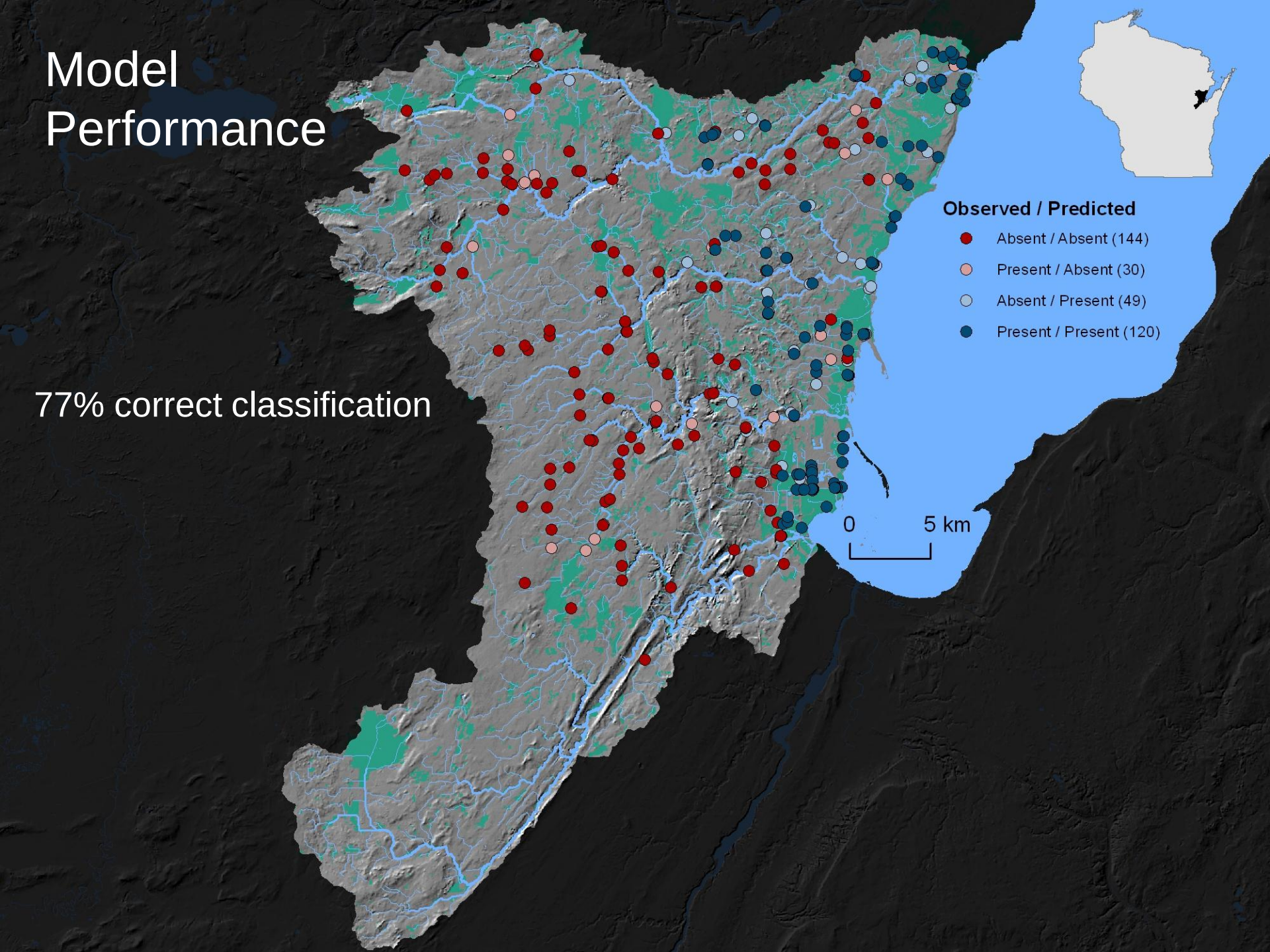
Model Structure

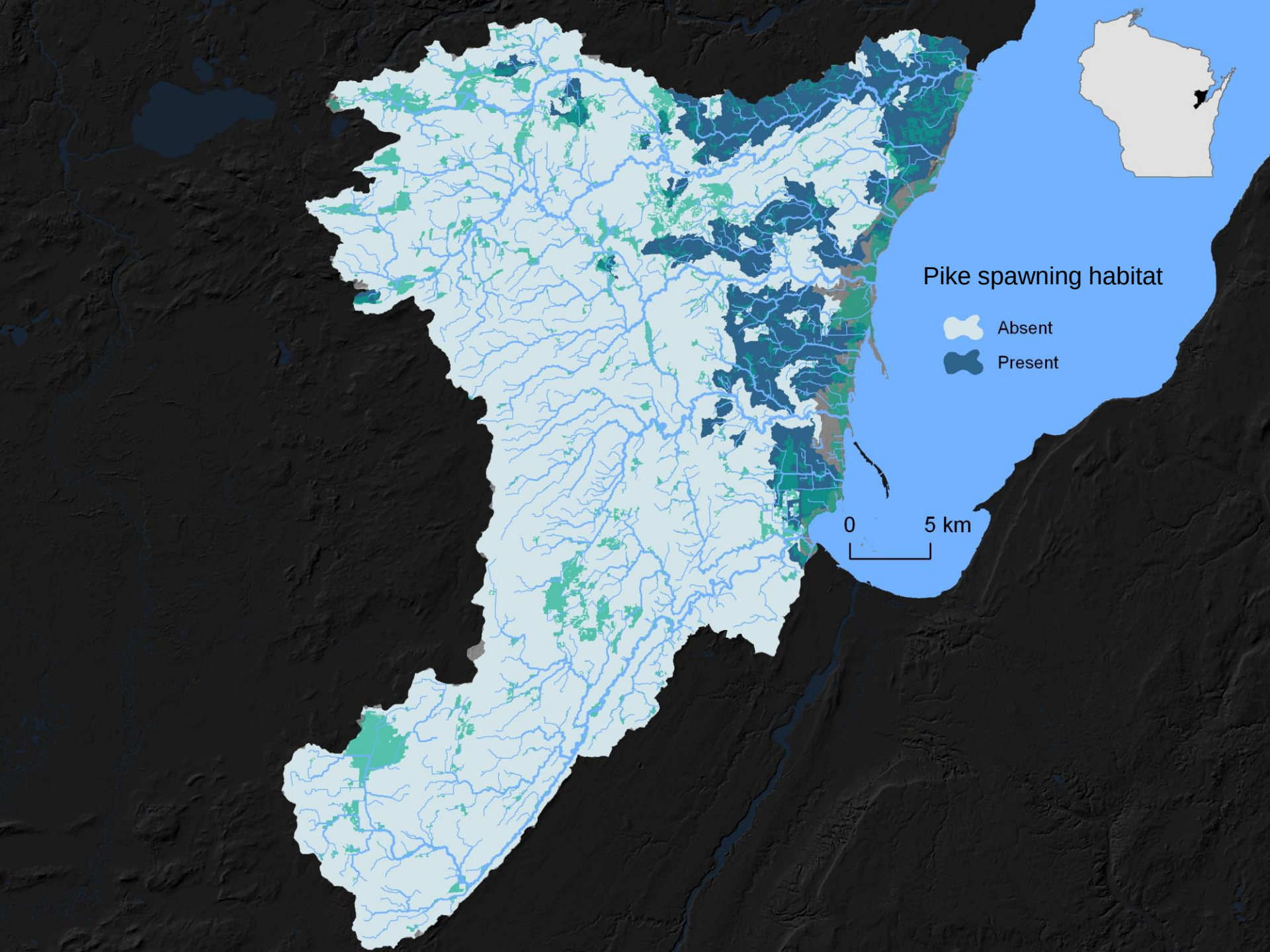


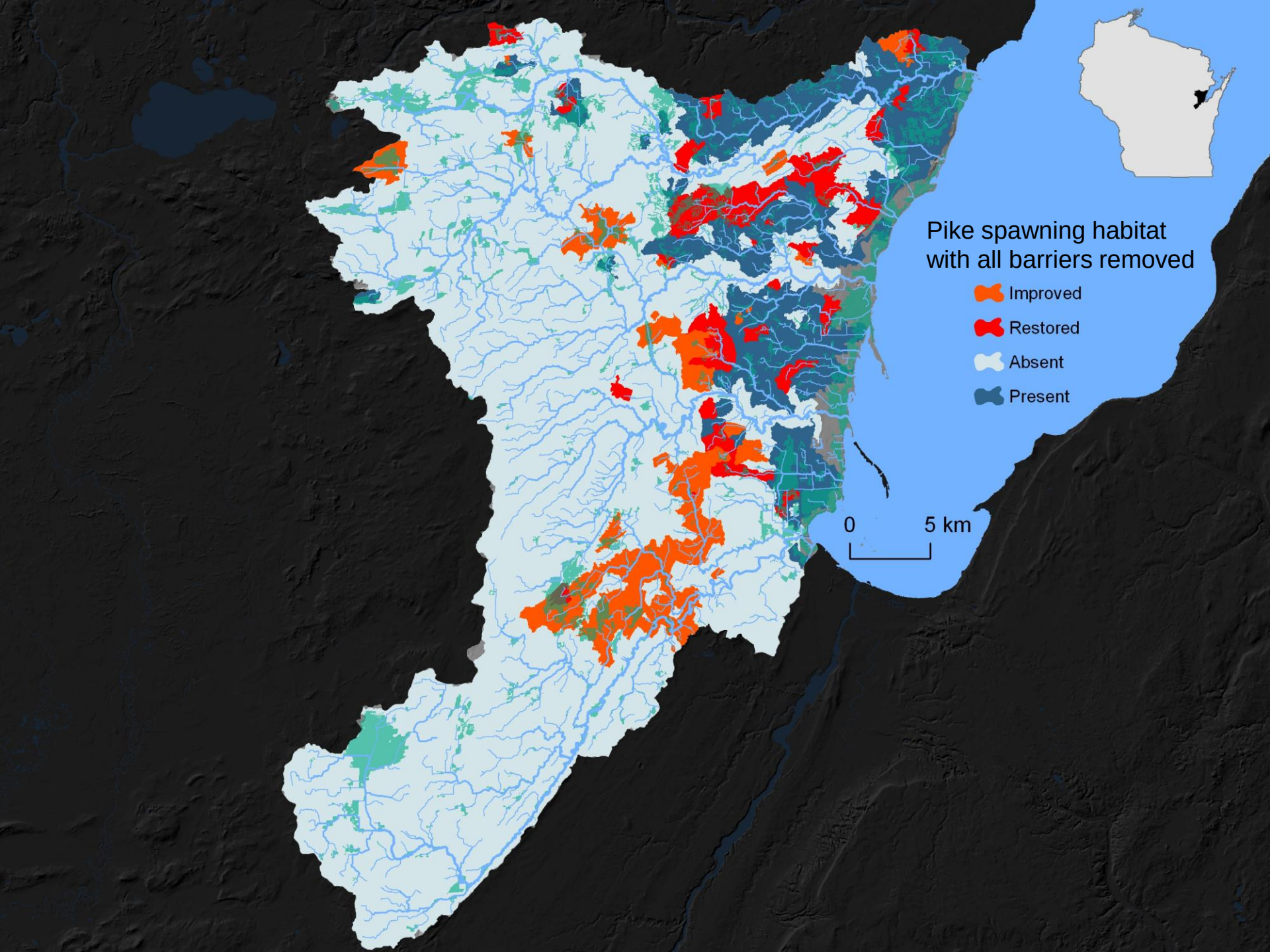
% Forest and Wetland	**0**	**0**	**0**	**0**	**60**	**60**	**60**	**60**
Distance from Bay	**1 km**	**1 km**	**50 km**	**50 km**	**1 km**	**1 km**	**50 km**	**50 km**
Downstream Passability	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**1**

Model Performance

77% correct classification




Pike spawning habitat
Absent
Present
0
5 km

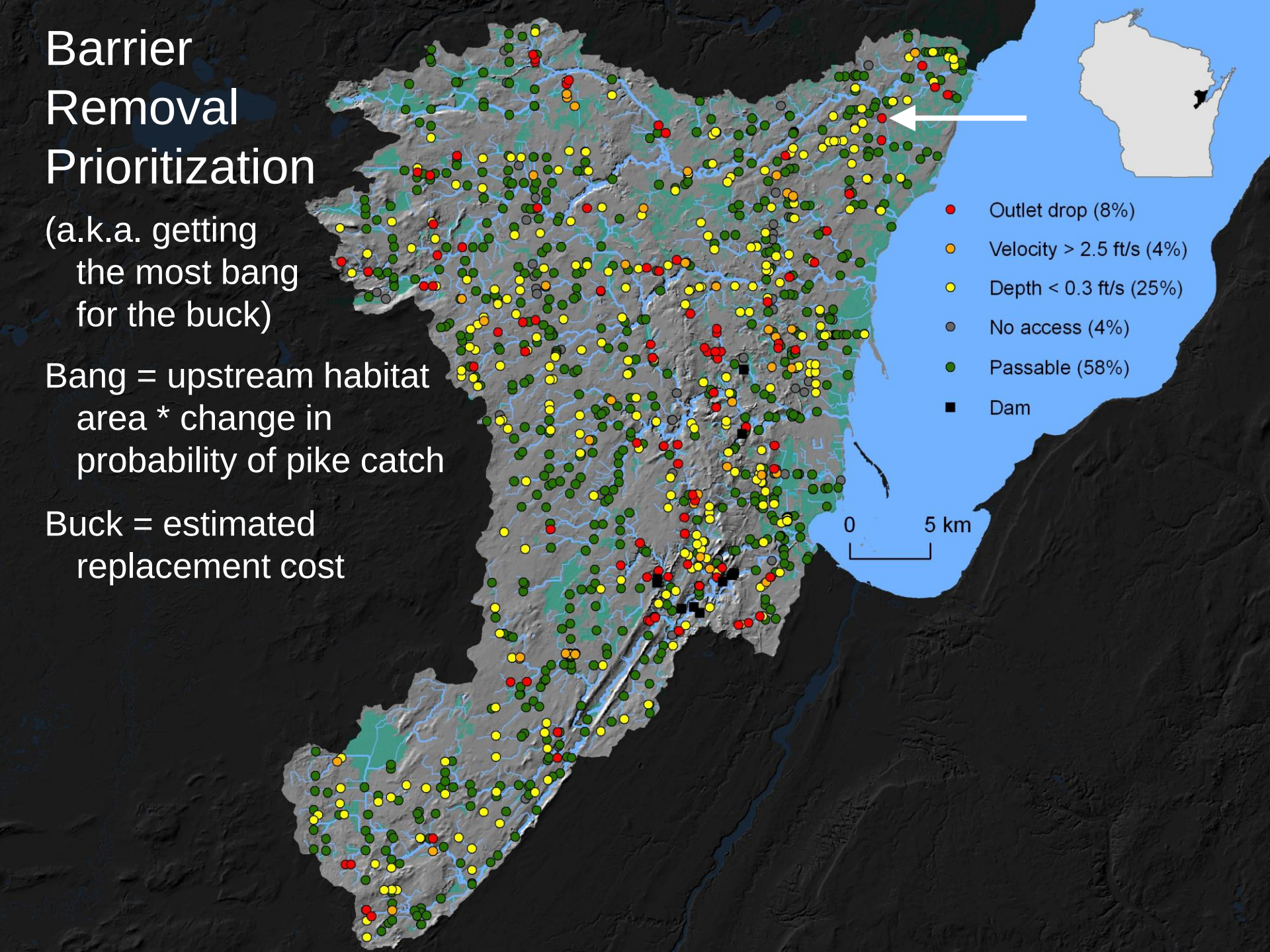

Pike spawning habitat
with all barriers removed
Improved
Restored
Absent
Present
0
5 km

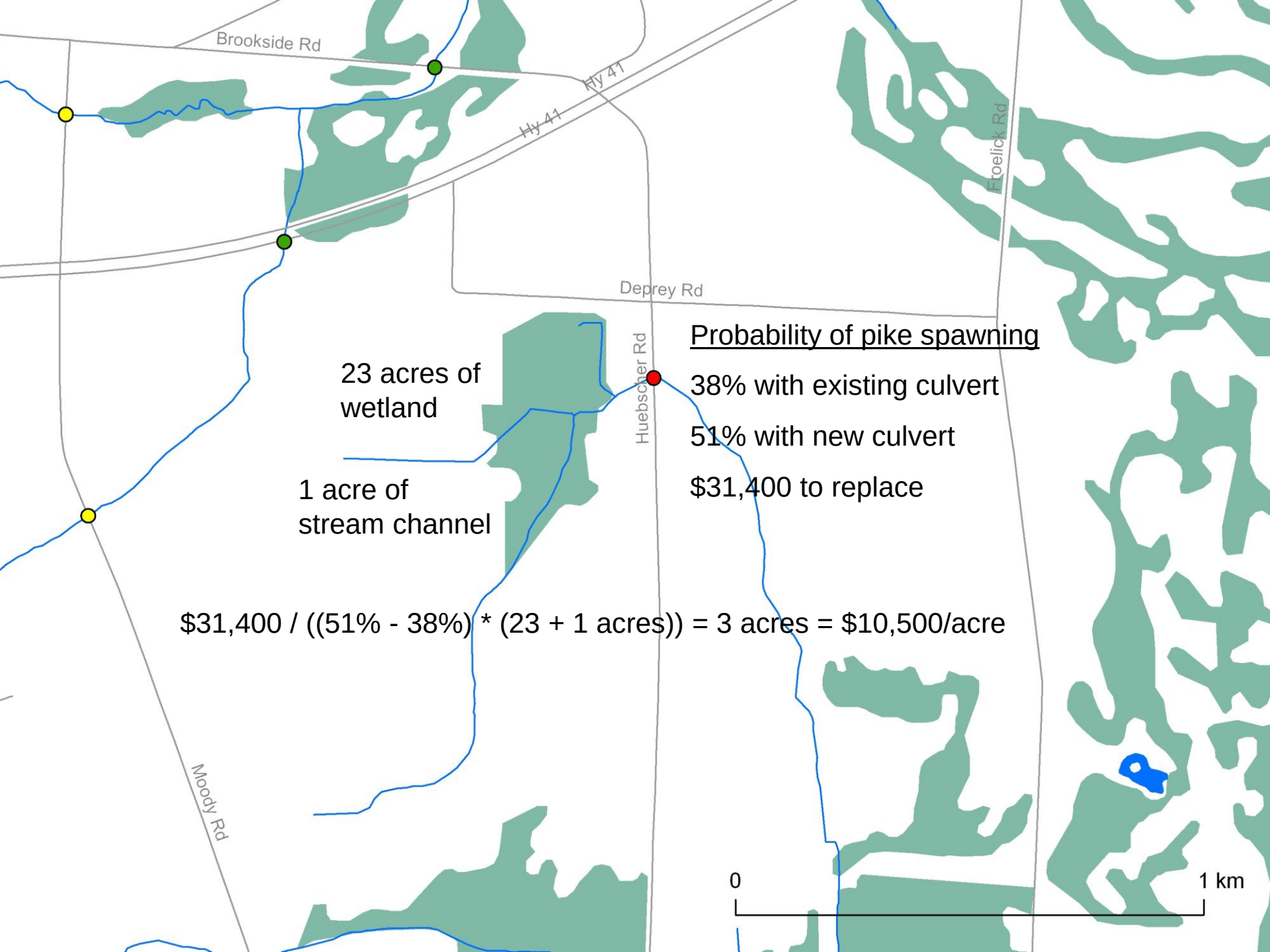
Barrier Removal Prioritization

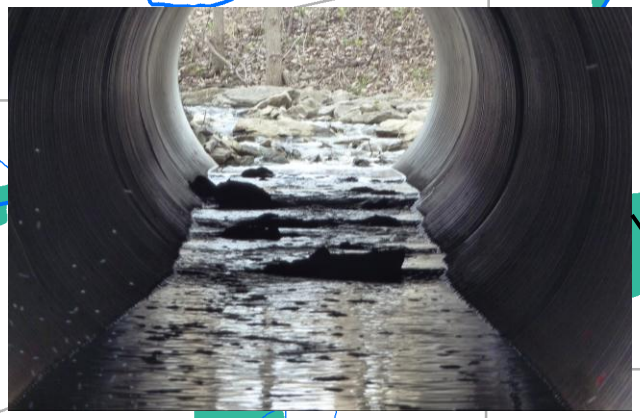
(a.k.a. getting the most bang for the buck)

Bang = upstream habitat area * change in probability of pike catch

Buck = estimated replacement cost




Brookside Rd
Hy 41
Hy 41
Froelick Rd
Deprey Rd
Huebscher Rd
Moody Rd
Probability of pike spawning
38% with existing culvert
51% with new culvert
$31,400 to replace
23 acres of wetland
1 acre of stream channel
$31,400 / ((51% - 38%) * (23 + 1 acres)) = 3 acres = $10,500/acre
0
1 km



2

1

3

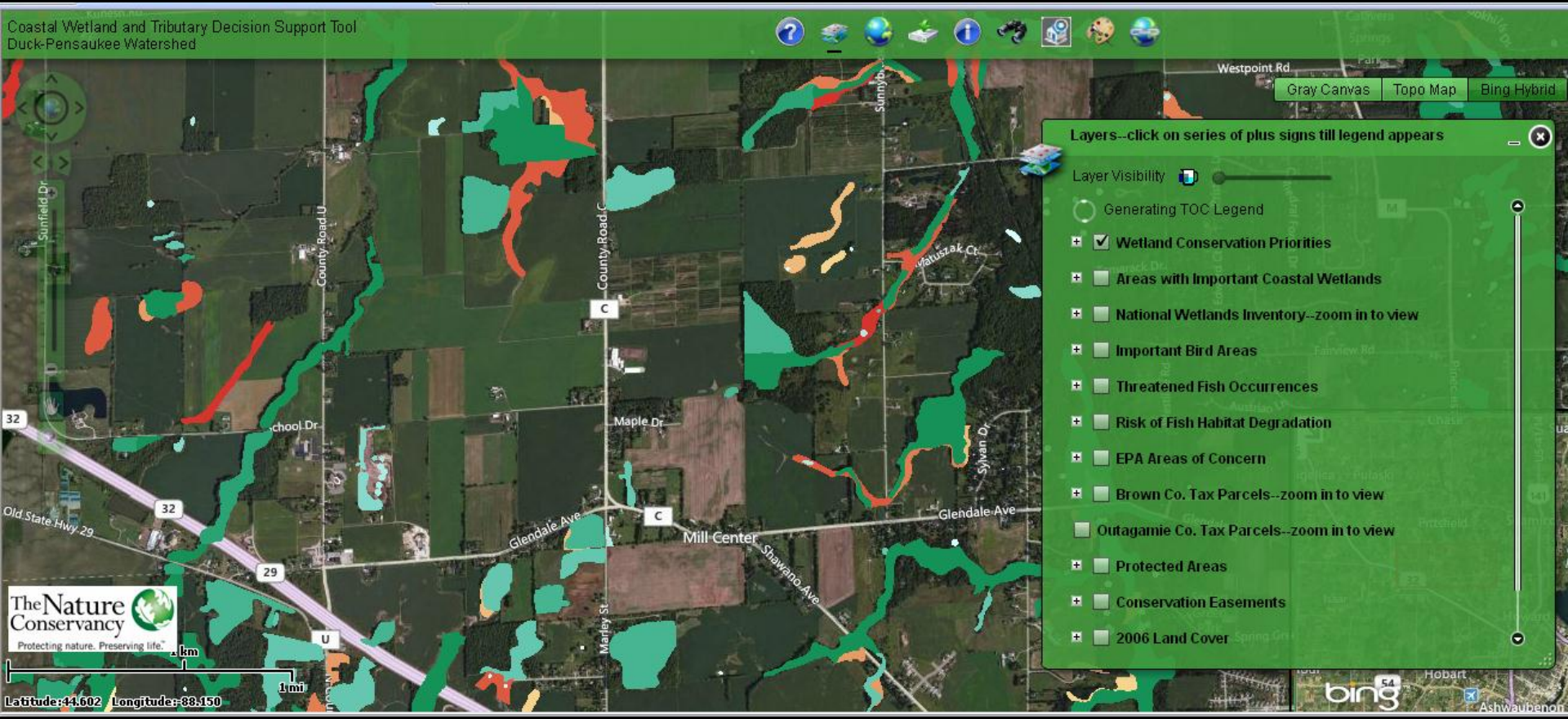
3

1

1

Coastal Wetland and Tributary Decision Support Tool

https://maps.tnc.org/duckpentool/



Summary

- Patterns of northern pike larval production show that road crossing barriers limit access to spawning habitat.
- Lessons learned:
  - Efficient survey protocols and data management are critical for conducting inventories in large watersheds.
  - Communicate value of projects in terms of “bang for the buck”.
  - Interactive decision support tool will help make a complex model usable by many stakeholders.

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